


# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 0000055477/SB		<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/EP2005/003209		International filing date ( <i>day/month/year</i> ) 26.03.2005		Priority date ( <i>day/month/year</i> ) 30.03.2004
International Patent Classification (IPC) or national classification and IPC C08J3/24, A61L15/60				
Applicant BASF AKTIENGESELLSCHAFT et al.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> <i>sent to the applicant and to the International Bureau</i> a total of 3 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> <i>(sent to the International Bureau only)</i> a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand  14.01.2006		Date of completion of this report  29.03.2006		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer  Otegui Rebollo, J Telephone No. +49 89 2399-8670		



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2005/003209

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements**\* of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-40 as originally filed

**Claims, Numbers**

1-12 received on 03.03.2006 with letter of 03.03.2006

**Drawings, Sheets**

1/1 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2005/003209

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-11
	No: Claims	12
Inventive step (IS)	Yes: Claims	
	No: Claims	1-12
Industrial applicability (IA)	Yes: Claims	1-12
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/EP2005/003209

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: WO 02/20068 A (STOCKHAUSEN GMBH & CO. KG; MERTENS, RICHARD; HARREN, JOERG) 14 March 2002 (2002-03-14)
- D2: WO 99/42515 A (BASF AKTIENGESELLSCHAFT; FUNK, RUEDIGER; FRENZ, VOLKER; STUEVEN, UWE;) 26 August 1999 (1999-08-26)
- D3: WO 03/002623 A (BASF AKTIENGESELLSCHAFT; FUNK, RUEDIGER; HERFERT, NORBERT; WANIOR, MAR) 9 January 2003 (2003-01-09)
- D4: WO 01/91815 A (BASF AKTIENGESELLSCHAFT) 6 December 2001 (2001-12-06)

1. The subject-matter of claim 12 of the present application appears to be novelty anticipated (Article 33(2) PCT) by the surface-crosslinked superabsorbent polymers using ethylene glycol diglycidyl ether (EGDGE) as disclosed in documents D1 (see in particular example 2), D3 (see in particular the examples) and D4 (see passages cited in the search report). It is pointed out that it appears to be impossible to always and unequivocally determine on a manufactured surface-crosslinked superabsorbent polymer whether or not 1,3-propanediol was used as co-solvent in the surface-crosslinking step (see also Article 6 PCT). Furthermore, it is not apparent from the process claims that the 1,3-propandiol, apparently used as an inert solvent in the crosslinking step of the application (see page 32, lines 21 to 26 of the application), will always remain in the product as a removal step is not excluded from the process claims.

2. The subject-matter of claims 1 to 11 of the present application appears to lack an inventive step (Article 33(3) PCT) over D3, which discloses the use of ethylene glycol diglycidyl ether as surface crosslinker by curing temperatures of about 150 °C (see in particular example 8b) in combination with D1, which discloses the use of aqueous 1,3-propanediol crosslinker solutions in surface-crosslinking superabsorbent polymers (see example 1) and curing temperatures are about 150 °C (see abstract). Note that the curing

temperatures in the process of the invention are also actually about 150 °C (see the passage common to pages 8 and 9 of the application). Furthermore, the information given in the abstract of D1 concerning processing temperatures is not in contradiction with the general teaching of D1 as this document does not contain any clear advice deterring the skilled person from working at a temperature of 150 °C. Therefore, the skilled person would have considered using curing temperatures of about 150 °C in the performance of further surface crosslinking processes combining the solvent features example 1 of D1 and the EGDGE crosslinker of example 8b of D3 as a routine step in order to prepare further surface-crosslinking superabsorbent polymers with good properties. Furthermore, the claimed subject-matter is obscured (Article 6 PCT) by the fact that the application does not apparently disclose how the claimed degree of surface crosslinking is to be precisely ascertained, and examples 1 and 3 of the application fall outside the scope of said claimed subject-matter as in said examples only crosslinker solutions containing 19 wt-% 1,3-propanediol were used. Furthermore, it is not apparent from example 2 which runs of 1,3-propanediol and propylene glycol thereof show the same (ie predetermined) degree of surface crosslinking as claimed, as in all runs the same amount of crosslinker was apparently used (ie that of example 1), and therefore it is not apparent which runs of 1,3-propanediol and propylene glycol may be compared in order to establish a technical effect. In view of this it is not apparent that any particular technical problem including that disclosed on page 6, lines 13 to 27 of the application has been actually been solved by the claimed subject-matter as the key feature for the solution of this latter: the fact that the surface-crosslinker solution is free of propylene glycol (see page 31, lines 16 to 18 of the applicaiton) is not recited in the claimed subject-matter. Note also that no novelty or inventive step may be based on unclear features.

**WHAT IS CLAIMED IS:**

1. A method of surface crosslinking a superabsorbent polymer comprising the steps of:

- (a) providing superabsorbent polymer particles;
- (b) forming a surface-crosslinker composition comprising ethylene glycol diglycidyl ether, water, and 20 to 35 wt% of 1,3-propanediol as a cosolvent;
- (c) applying the solution of (b) to the surfaces of (a) to provide surface-treated superabsorbent polymer particles; and
- (d) heating the surface-treated superabsorbent polymer particles at 25°C to 150°C for 15 to 180 minutes to form surface crosslinks in the vicinity of the surface of the surface-treated superabsorbent polymer particles,

wherein the amount of ethylene glycol diglycidyl ether in (b) is at least 5 wt% less than the ethylene glycol diglycidyl ether used when propylene glycol is a cosolvent to achieve a predetermined degree of surface crosslinking.

2. The method of claim 1 wherein step (c) is performed prior to step (d).

3. The method of claim 1 wherein steps (c) and (d) are performed simultaneously.

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4. The method of one of the claims 1 to 3 wherein the amount of ethylene glycol diglycidyl ether in (b) is at least 10 wt% less than the ethylene glycol diglycidyl ether used when propylene glycol is used as a cosolvent to achieve a predetermined degree of surface crosslinking.

5. The method of one of the claims 1 to 4 wherein the amount of ethylene glycol diglycidyl ether in (b) is 5 wt% to 25 wt% less than the ethylene glycol diglycidyl ether used when propylene glycol is used as a cosolvent to achieve a predetermined degree of surface crosslinking.

6. The method of one of the claims 1 to 5 wherein the surface-crosslinking solution comprises 25 to 30 wt% of the 1,3-propanediol.

7. The method of one of the claims 1 to 6 wherein the surface-crosslinking solution is free of propylene glycol.

8. The method of one of the claims 1 to 7 wherein the surface-crosslinker solution consists essentially of ethylene glycol diglycidyl ether, water, and 1,3-propanediol.

9. The method of one of the claims 1 to 8 wherein the surface crosslinks are formed by essentially only the ethylene glycol diglycidyl ether.

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10. The method of one of the claims 1 to 9 wherein the superabsorbent polymer comprises a neutralized lightly crosslinked acrylic-type resin containing at least 10% acidic monomer units selected from the group consisting of a carboxylate, sulfonate, sulfate, and phosphate group.

11. The method of one of the claims 1 to 10 wherein the superabsorbent polymer comprises polyacrylic acid neutralized 50 to 100 mole percent.

12. Surface-crosslinked superabsorbent polymers prepared by the method of one of the claims 1 to 11.

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